UNDERGRADUATE COURSES:

CS 121 PROBLEM SOLVING 4 HOURS

Prerequisite: Enrollment in the Gatton Academy of Mathematics and Science in Kentucky
Students will tackle problems ranging from elementary to advanced, using mathematical
methods, algorithmic techniques, and computational methods. This course is taught jointly by
mathematics and computer science faculty; it is equivalent to MATH 121.

CS 145 INTRODUCTION TO COMPUTING 3 HOURS

Prerequisite: Two years of high school college preparatory mathematics.
An introduction to the use of the computer that explores what a computer is, what it can do, and
how it does it. The following topics are surveyed: hardware, software, telecommunications,
programming languages, software development, a short history of computing, and the
computer's impact on society. Projects in word processing, spreadsheets, file management, and
BASIC are assigned. NOT ACCEPTABLE FOR CREDIT IN COMPUTER SCIENCE MAJOR OR MINOR.

CS 146 INTRODUCTION TO PROGRAMMING 3 HOURS

Prerequisite: Two years of high school algebra or concurrent enrollment in a college algebra
course.
A study of the algorithmic approach in the analysis of problems and their computational
solutions. A structured language will be introduced and used in solving assigned problems. Lab
sessions may be held in addition to lecture sessions. NOT ACCEPTABLE FOR CREDIT IN
COMPUTER SCIENCE MAJOR OR MINOR.

CS 157 INFORMATION SECURITY I 3 HOURS

Prerequisite: None
An introduction to the concepts, issues, and essential skills of computer security. Topics include
computer-based systems, Internet communications, networking, and security. Laboratory
sessions will be held as needed. May not be counted toward a computer science major or minor.

CS 170 PROBLEM Solving ANG PROGRAMMING 3 HOURS

Prerequisite: 2 years of high school algebra
The fundamentals of problem solving, program design, and program development techniques. A
high-level programming language is used and lab experiences are included. The course may
not be counted toward a computer science major or minor.

CS 180 COMPUTER SCIENCE I 4 HOURS

Prerequisite: CS 170 with a grade of C or higher, or a satisfactory score on a CS placement test,
or eligibility for MATH 117 (based on criteria developed by the Department of Mathematics and
Computer Science).
A study of the algorithmic approach to the analysis of problems and their computational
solutions, using a high-level structured language. Labs are included in the course.
CS 181 COMPUTER SCIENCE II 4 HOURS

Prerequisite: Phil 215 and CS 180 with grades of C or better and eligibility to enroll in a calculus course based on criteria developed by the Department of Mathematics and Computer Science. Continued study of algorithmic problem solving techniques using software engineering and a high-level programming language. Introduction to data structures and their applications. Labs are included in the course.

CS 239 PROBLEM SOLVING WITH COMPUTATIONAL TECHNIQUES 3 HOURS

Prerequisite: MATH 117 with a grade of "C" or better or placement into a science calculus course
Solving engineering problems using computational techniques. Topics include problem definition, algorithm development, flowcharting, input/output and structured programming. (May count as 1.5 hours towards a major/minor in Computer Science.)

CS 245 INTRODUCTION TO A COMPUTER PROGRAMMING LANGUAGE 1.5 HOURS

Prerequisites: A grade of "C" or better in CS 146 (or equivalent) and consent of instructor
Designed to introduce the syntax, advantages, limitations, and selected applications of a particular programming language such as ADA, BASIC, C, FORTRAN, LISP, COBOL, PL/I, or assembly language. Will not count toward a computer science major or minor if credit is received for an introduction to the same language in another course. May be repeated for up to 3 semester hours credit.

CS 249 CONSULTING PRACTICUM IN COMPUTER SCIENCE 1-2 HOURS

Prerequisites: Consent of the instructor
An opportunity for undergraduates to utilize computer skills and enhance communication abilities by serving as consultants for lower divisional students on computer laboratory assignments. Will not count as hours toward the major/minor. May be repeated for up to a total of four hours credit with a maximum of two hours per semester. Offered on a PASS/FAIL basis. (One hour of semester credit requires four non-paid hours per week of consulting time in the laboratory).

CS 250 SOCIAL IMPLICATIONS OF COMPUTING 1.5 HOURS

Co-requisite: CS 180
A survey course on the role of computing in society, designed primarily for computer science majors and minors. Discusses current topics related to the use of computing and associated trends.

CS 251 INTRODUCTION TO DATABASE 3 HOURS

Prerequisites: CS 181 with a grade of "C" or better
An introduction to relational database management systems and their applications, including the essential skills and methods for the design, development, and implementation of database systems.
CS 257 INFORMATION SECURITY II 3 HOURS
Prerequisites: CS 157 with a grade of C or better
An overview of information security technologies, management practices and current standards. Topics include security models and technologies, threat analysis and security implementation, risk and incident response management and security policy. Lab sessions will be held as needed. May not be counted toward a computer science major or minor.

CS 270 INTRODUCTION TO WEB PROGRAMMING 3 HOURS
Prerequisites: CS 146, or CS170, or CS180 with grade of "C" or better
Introductory course in web programming and web application development. Provides students with essential skills for developing basic client-side and server-side applications.

CS 280 COMPUTER SCIENCE III 3 HOURS
Prerequisites: A grade of "C" or better in CS 181, MATH 119, 122, or 136
Finite and discrete algebraic structures, including Boolean algebras, directed and undirected graphs and the applications of these structures in computer science.

CS 295 INTRODUCTION TO RESEARCH METHODOLOGY 1 HOUR
Prerequisite: Ogden Research Scholar, or 3.2 grade point average at the end of freshman year, or OCSTH faculty member recommendation
To familiarize Ogden Research Scholars and other research oriented students, with the fundamentals of choosing a research topic, performing a bibliographical search on a subject, topic, classification of instruments, data taking, data reduction, professional ethics and other research oriented topics. The common points of research methodology in the different scientific areas will be accentuated. Examples will be drawn from the various disciplines. Use of computers will be emphasized. (Course does not count towards any major or minor).

CS 315 INTRODUCTION TO UNIX 3 HOURS
Prerequisite: CS 181 (co-requisite)
Use of the UNIX operating system as a program development environment. Topics include programming tools like debuggers, make, advanced editing, shell programming, and use of the X Window system.

CS 325 COMPUTER SYSTEMS HARDWARE AND SOFTWARE II 3 HOURS
Prerequisites: CS 181 with grade of "C" or better
Introduction to computer organization and architecture. Topics include computer number representations, computer arithmetic, CPU operations, assembly programming, instruction sets, I/O memory management, system performance, and parallelism.
CS 349 CONSULTING PRACTICUM IN COMPUTER SCIENCE 1-2 HOURS

Prerequisites: Junior status, a grade of "C" or better in CS 325, and consent of instructor
An opportunity for undergraduates to utilize computer skills and enhance communication abilities by serving as consultants for lower level students on computer laboratory assignments. Will not count as hours towards the major/minor. May be repeated for up to a total of four hours credit with a maximum of two hours per semester. (One hour of semester credit requires four non-paid hours per week of consulting time in the laboratory.) (pass/fail)

CS 360 SOFTWARE ENGINEERING I 3 HOURS

Prerequisites: A grade of "C" or better in CS 181
Modern development cycle examined via software engineering: needs assessment, requirements analysis, user interface, design, construction, test, maintenance/enhancement. Current methodologies and tools: data dictionary, data flow diagrams, structured walkthroughs, teams, program management. Case studies involving automated CASE and expert systems.

CS 369 COOPERATIVE EDUCATION IN COMPUTER SCIENCE 1-3 HOURS

Prerequisites: Application for enrollment in cooperative education plan; approval of department head and co-op faculty advisor
Practical experience in a supervised work situation with a cooperating business, industry, social or governmental agency. May be repeated for up to 3 hours credit in the major or minor.

CS 370 XML AND WEB PROGRAMMING 3 HOURS

Prerequisite: CS 270 and CS 280 with grades of "C" or better
A detailed study of tiered Web application development. Focus is on developing applications that process and transform XML data and integrate it with databases.

CS 371 ADVANCED COMPUTATIONAL PROBLEM SOLVING 3 HOURS

Prerequisite: CS 180 with a grade of C or better
Corequisites: MATH 136. Special requirement: Enrollment in the Gatton Academy of Mathematics and Science or Honors Program eligibility at WKU.
Problem-solving tools and techniques, with an emphasis on mathematical reasoning, algorithmic techniques, and computational methods. Techniques and tools are applied to (research) areas of interest to enrolled students, in the context of a project involving program design and implementation. The course is taught jointly by Mathematics faculty and Computer Science faculty. Equivalent course MATH 371.

CS 380 DATA STRUCTURES AND ALGORITHM ANALYSIS 3 HOURS

Prerequisite: A grade of C or better in CS 280 and STAT 301
Important data structures, algorithms, and their applications, emphasizing algorithm analysis and general algorithmic strategies. Includes balanced search trees, hashing, and priority queues, sorting, and graph algorithms.
CS 381 INTRODUCTION TO COMPUTER NETWORKS 3 HOURS

Prerequisite: CS 280 with grades of “C” or better
An introduction to the design and analysis of computer networks and their applications, including the basics of data communication, network topologies, protocols, routing and switching, naming and addressing.

CS 382 PROGRAMMING LANGUAGES 3 HOURS

Prerequisite: A grade of C or better in CS 181
A study of principles and common features of imperative and functional programming languages. Topics include syntax, semantics, names, binding, type checking, scope, overloading, and data abstraction.

CS 396 INTERMEDIATE SOFTWARE PROJECT 3 HOURS

Prerequisite: A grade of C or better in CS 251, ENG 307, and either COMM 161 or COMM 145
The course enhances each student’s abilities to craft software through the development of a significant group project which requires a variety of skills. Topics include simple data analysis and design, group problem solving, human-computer interface design, software project management, security, and quality control. The technical work will be complemented by written and oral technical presentations.

CS 405/G NUMERICAL ANALYSIS I (MATH 405) 3 HOURS

Prerequisites: MATH 237 or 307 or 310, and a grade of “C” or better in CS 180 or CS 146 or consent of instructor
Roots of equations, linear operators, polynomial approximation and interpolation, numerical differentiation and integration. Computer solutions of problems will be required.

CS 425 OPERATING SYSTEMS I 3 HOURS

Prerequisites: A grade of C or better in CS 325 and CS 382
Overview of the concepts/theory that underlay operating systems with emphasis on process management, memory management, scheduling, multiprocessing, etc.

CS 443/G DATA BASE MANAGEMENT SYSTEMS 3 HOURS

Prerequisites: A grade of “C” or better in CS 251 and CS 280, or permission of instructor.
Organization and management of large data files, various database paradigms, database design theory, query optimization, physical database design, database security, distributed databases.

CS 445/G OPERATING SYSTEMS II 3 HOURS

Prerequisite: A grade of "C" or better in CS 425
Advanced study of modern operating system theory and practice. Topics include distributed system structures and coordination, distributed file systems, and protection and security.
CS 446/G INTERACTIVE COMPUTER GRAPHICS 3 HOURS

Prerequisites: MATH 307, A grade of "C" or better in CS 280
Introduction to elementary topics in interactive computer graphics. Input devices, display devices, and techniques for 2-D and 3-D transformation will be explored as well as difficulties encountered in each of these areas. Assignments will be used to emphasize interaction, data structures, and applications to various disciplines.

CS 450/G COMPUTER NETWORKS 3 HOURS

Prerequisite: CS 325 and CS 381 with grades of "C" or better, or permission of instructor
An advanced study of the design and implementation of computer networks. Topics include network topologies, switching techniques, routing, end-to-end protocols, quality of service, and other advanced topics, e.g. wireless networks and multimedia networks.

CS 456/G ARTIFICIAL INTELLIGENCE 3 HOURS

Prerequisites: A grade of "C" or better in CS 280, 360
Study of problems which have no plausible algorithmic solution. Their computer representations and solutions usually involve heuristics.

CS 473 INTRODUCTION TO GRAPH THEORY 3 HOURS

Prerequisite: Math 307 and Math 310
Fundamental concepts, key ideas and tools in graph theory, with an emphasis on proof methods, algorithms, and applications. Techniques and tools are applied to practical optimization problems and other areas of mathematics and computer science. This course is equivalent to Math 473.

CS 475/G SELECTED TOPICS IN COMPUTER SCIENCE 1-3 HOURS

Prerequisite: Permission of instructor
A consideration of special topics which will acquaint the advanced student with significant problems and developments of current interest in computer science.

CS 476/G RESEARCH METHODS AND PROJECTS IN COMPUTER SCIENCE 3 HOURS

Prerequisite: A grade of "C" or better in CS 360
The languages, programming techniques and skills acquired in the sequence of core courses in the undergraduate program are applied to the analysis and design of computer-based systems. Top-down design techniques are applied in one or more large-scale programs which require attention to the documentation, communication, and inter-facing or modules in a team project. These techniques are essential in most large-scale research applications of computers. May be repeated for 6 hours.
CS 496 SENIOR PROJECT and PROFESSIONAL PRACTICE 3 HOURS

Prerequisite: CS 360 and CS 396
Student teams of qualifying seniors will design and implement complex capstone software projects. Topics include practical issues of software development, quality assurance and deployment, project management, computing ethics, and professional practice.